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IDENTIFIERS Service Station Attendants

ABSTRACT

An instructor's manual and student activity guide on auto electrical systems are provided in this set of prevocational education materials which focuses on the vocational area of trade and industry. (This set of materials is one of ninety-two prevocational education sets arranged around a cluster of seven vocational offerings: agriculture, home economics, distributive education, health occupations, world of work, trade and industry, and office occupations.) The instructor's guide is organized into the following elements: title of activity, duration of activity (six to eleven periods), activity goals, fifteen instructional objectives, related vocational clusters, and activity implementation (description, materials needed, safety considerations, teacher preparation prior to class, during the class, follow-up activities, answer key to student check point activities 1 and 2, student question sheet and check sheet to be duplicated). The student activity guide provides step-by-step instructions (narrative and illustrations) for completing each instructional objective (e.g., identify nine tools used for engine tune-up, replace points and condenser on engine mock-up.) At the end of each set of instructions is a student check point (evaluation activity). Occupational descriptions for an automobile mechanic and a service station attendant conclude the document. (JH)

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ED169337

T & I – AUTO MECHANICS

ELECTRICAL SYSTEM

Kit No. 48

INSTRUCTOR'S MANUAL

Prepared by

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State Department of Education
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Prevocational Education
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In Cooperation With

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1978

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TITLE OF ACTIVITY

Kit No. 48, T & I – Auto Mechanics, Electrical System

DURATION

Main Activity – 5 to 8 periods
Follow-up Activity – 1 to 3 periods

GOALS

The student will have an understanding of auto electrical problems and their solutions. He/she will perform an electrical tune-up to the engine mock-up.

INSTRUCTIONAL OBJECTIVES

The student will identify nine (9) tools used for engine tune-up.
The student will identify the parts of the ignition system.
The student will clamp the engine mock-up to a table.
The student will disconnect the spark plug wires.
The student will remove the spark plugs.
The student will gap the spark plugs.
The student will replace and torque the spark plugs.
The student will connect the spark plug wire.
The student will remove the distributor cap.
The student will remove the rotor.
The student will remove the points and condenser.
The student will replace the points and condenser.
The student will set the points.
The student will replace the rotor.
The student will replace the distributor cap.

VOCATIONAL CLUSTERS

Office Occupations
Health Occupations
Agriculture

ACTIVITY IMPLEMENTATION

A. Activity Description

This activity is concerned with automobile maintenance. After becoming familiar with the necessary tools and automobile parts, the student will perform the maintenance to the electrical system of a mock-up engine.

B. Safety

Care should be taken while using the socket wrenches and screwdrivers.

C. Materials

1. Audio Visual Equipment
   None
2. Technical Equipment
   4 engine mock-ups
   4 - ½" drive torque wrenches
   4 - ½" drive socket wrenches
   8 spark plug sockets, 5/8"
   4 feeler gages
   4 medium screwdrivers
   4 magnetic screwdrivers
   4 C-clamps
   32 spark plugs
   4 condensers
   4 points
   4 rotors
   4 wire feeler gages
3. Expendable Materials
   None

D. Preparation Prior To Class

Reproduce Student's Checklist, one per student.
Check tools.
Adjust the torque wrench to foot-pounds. Don't allow the students to use the torque wrench unless you have checked the torque prior to installing new spark plugs.

E. During Class Session

INTRODUCTION – This activity is

concerned with automobile maintenance. Almost everyone in our technological society owns and operates an automobile. The people involved in the area range from technical people, like automobile mechanics and diesel mechanics, to workers, like gas station attendants. Your activity will carry you through the jobs listed above. The activity itself is concerned with tuning up an engine. You, as a mechanic, will perform the electrical maintenance.

TO THE TEACHER

Hand out the student Checklist Sheets. Explain to the students that the Checklists must be approved by you before they proceed through the activity.

Divide your class into four equal groups.

Pass out two sheets of 8½" x 11" (21.6 cm x 27.9 cm) white paper to each student.

Give the students the Student Learning Activity Guide.

Instruct your students to follow the guide and turn in Checklists as they complete each Instructional Objective.

It should take the students 4 to 5 days for each group to complete the individual activity.

F. Follow-up Activities

1. Have each student fill out at least two (2) VIEW Fact Sheets.
2. Students will locate jobs related to auto-diesel mechanics and gas station attendants in the want ads of your local newspaper.

ANSWER KEY

Instructional Objective I

1. Feeler gage
2. Magnetic screwdriver
3. Torque wrench
4. Spark plug socket
5. Screwdriver
6. Drive socket wrench
7. C-clamp
8. Wire feeler gage

Instructional Objective II

1. Rotor
2. Distributor cap
3. Porcelain insulator
4. Secondary electrode
5. Gasket
6. Ground electrode
7. Spark plug wire
8. Condenser
9. Points
10. Spark plug

MASTERS FOR DUPLICATION

VIEW Fact Sheet
Student Check Sheet

VIEW FACT SHEET

NAME _____ CLASS _____ OCCUPATION _____

A. List the advantages (good points) of this occupation (job).

B. List the disadvantages (bad points) of this occupation (job).

C. List three things you should know to do this occupation (job).
1.
2.
3.

D. What type of education should you get to be prepared (do) for this occupation (job)?

E. What courses must you take to go into this occupation (job)?

F. What do you think your future in this occupation (job) will be?

G. What wage can you expect in this occupation (job)?

H. What are the working hours of this occupation (job)?

I. To learn more about this occupation (job), write to:

J. Using a scale of 1 to 5, circle the number that measures your interest in this occupation (job) as a possible career.

I don't like it. 1 2 3 4 5 I like it.

STUDENT CHECK SHEET

DATE _____ NAME _____

NO.	TASK	TEACHER'S INITIALS
1.	Tool Identification	_____
2.	Parts Identification	_____
3.	Disconnect Spark Plug Wire	_____
4.	Remove the Spark Plug	_____
5.	Gap the Spark Plug	_____
6.	Torque the Spark Plug	_____
7.	Replace the Spark Plug Wire.	_____
8.	Remove the Distributor Cap	_____
9.	Remove the Rotor	_____
10.	Remove the Points	_____
11.	Replace the Points	_____
12.	Set the Points	_____
13.	Replace Rotor	_____
14.	Replace Distributor Cap	_____

T & I – AUTO MECHANICS

ELECTRICAL SYSTEM

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LEARNING ACTIVITY GUIDE

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AUTO MECHANICS, ELECTRICAL SYSTEM

INTRODUCTION

This activity is concerned with automobile maintenance. Almost everyone in our technological society owns and operates an automobile. The people involved in this area range from technical people, like automobile mechanics and diesel mechanics, to workers like gas station attendants. Your activity will carry you through the jobs listed above. The activity itself is concerned with tuning up an engine. You, as a mechanic, will perform the maintenance to the electrical system of an 8-cylinder engine.

GOALS

The student will have an understanding of auto electrical problems and their solutions.

The student will perform an electrical tune-up to the mock-up engine.

DIRECTIONS

Follow each step carefully. Be sure to have your instructor initial your student Check Sheet after each objective is completed.

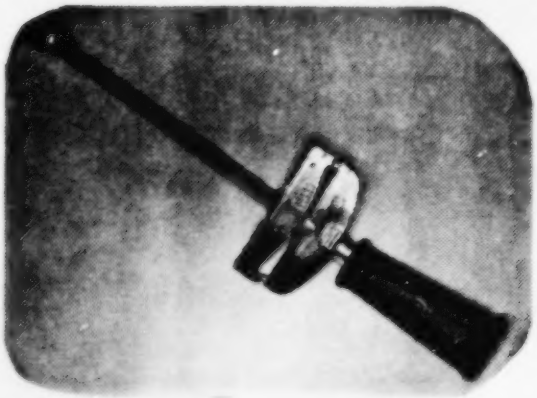
MATERIALS

The materials needed for this activity will be available to you during the activity. As you go through the activity, you will gain an understanding of their functions.

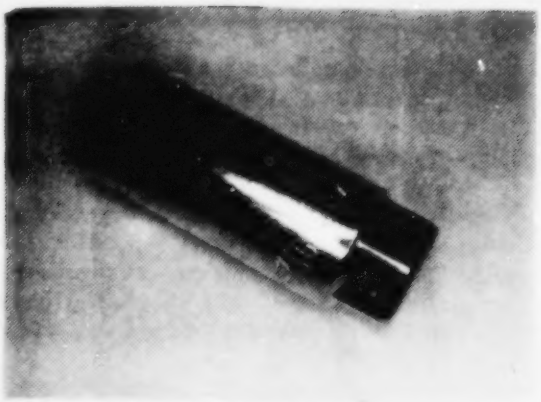
Instructional Objective 1

The student will identify 8 tools used for engine tune-up.

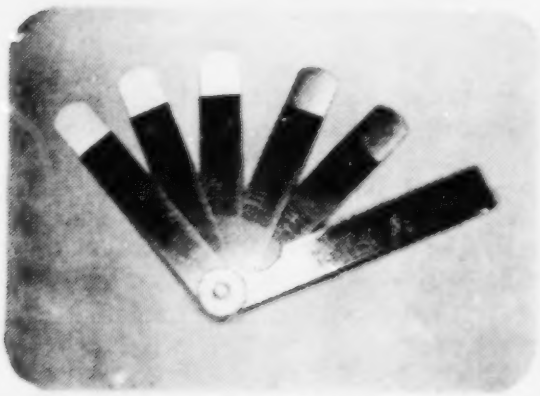
STEP 1 – ½" drive socket wrench is a tool used to tighten or loosen nuts and bolts.



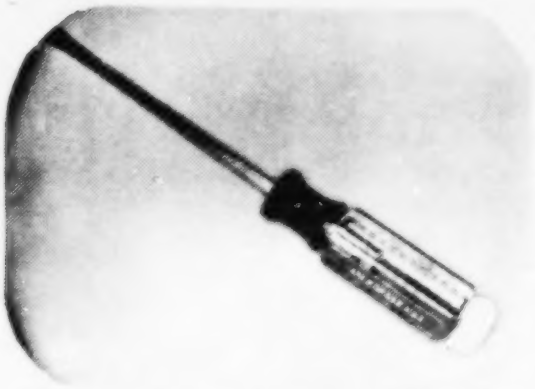
STEP 2 – ½" drive torque wrench is used to set a nut or bolt to a specific degree of pressure.



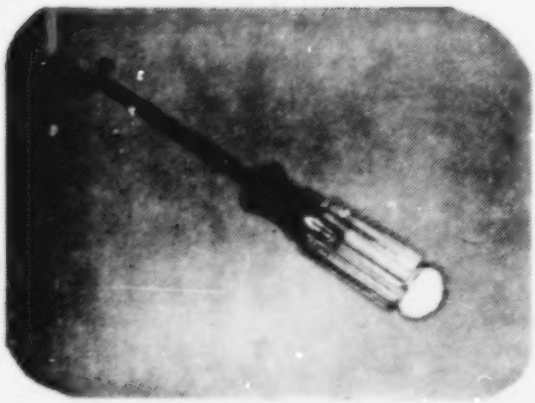
STEP 3 – 5/8" spark plug socket is used to remove and replace a spark plug.



STEP 4 – A feeler gage is a device used to set the gap between the contacts of the points.



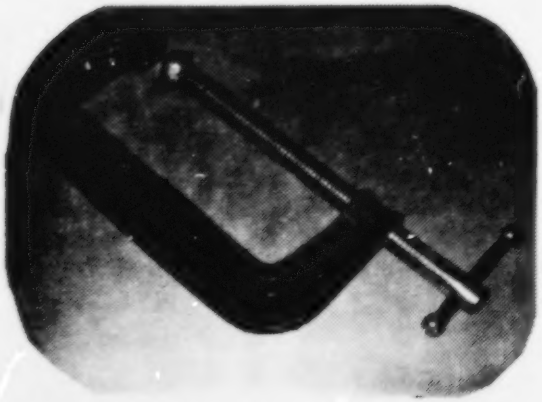
STEP 5 – A screwdriver is a tool used to loosen and tighten screws.



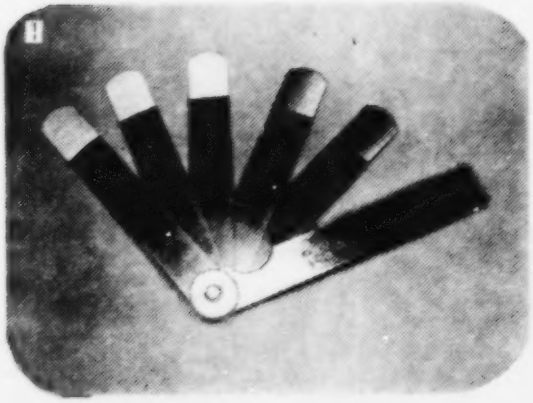
STEP 6 – A magnetic screwdriver has a magnetized blade used to pick up metal screws.

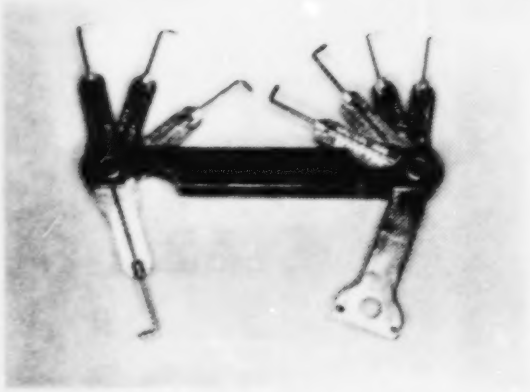
Check Point

On a separate sheet of paper, list 1 - 8 and identify the following tools. Turn in your sheet to the instructor.

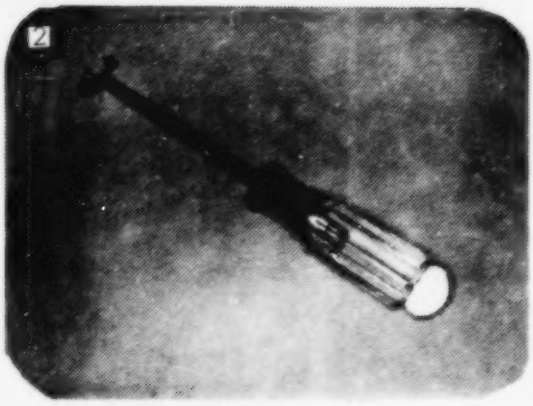


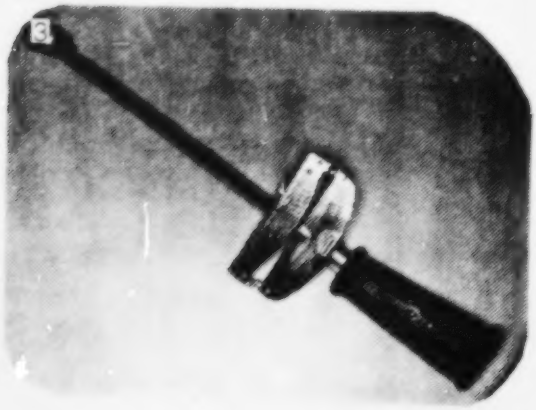
STEP 7 – A C-clamp is used to hold an object in a stationary position by pressure.





STEP 8 – A wire feeler gage is used to set the gap of the spark plug.





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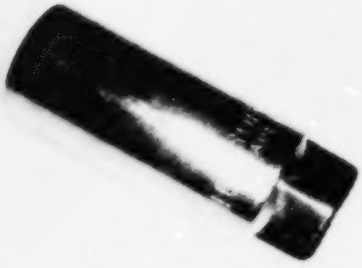
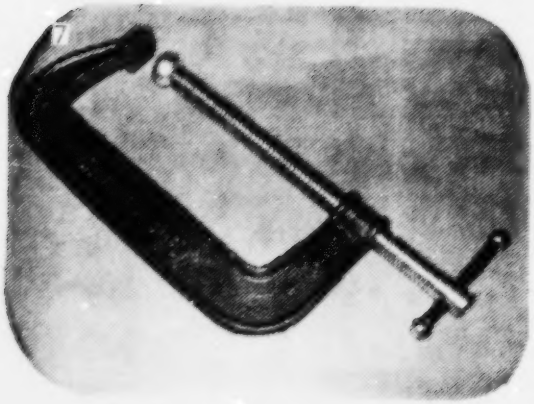
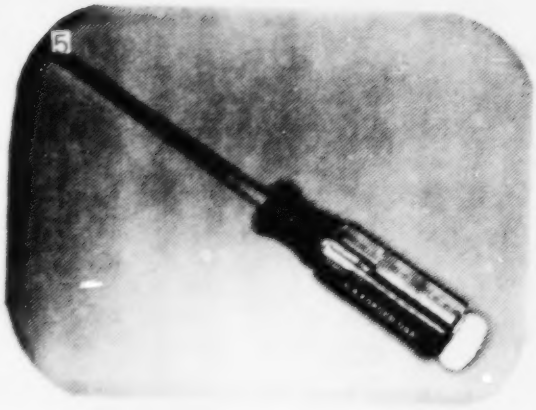
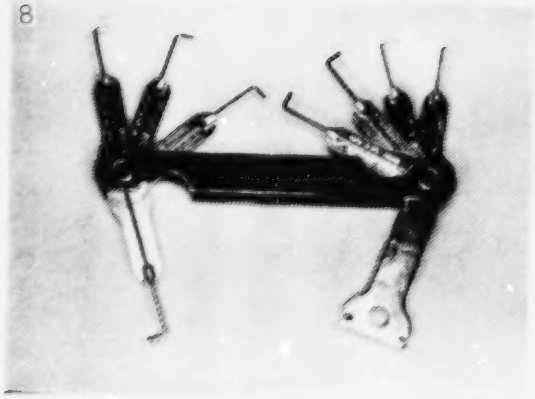


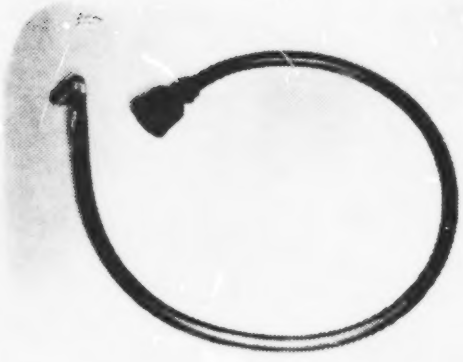






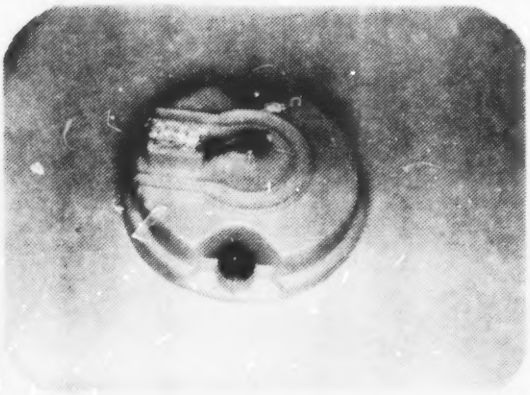
Instructional Objective II

The student will identify the parts of the ignition system.



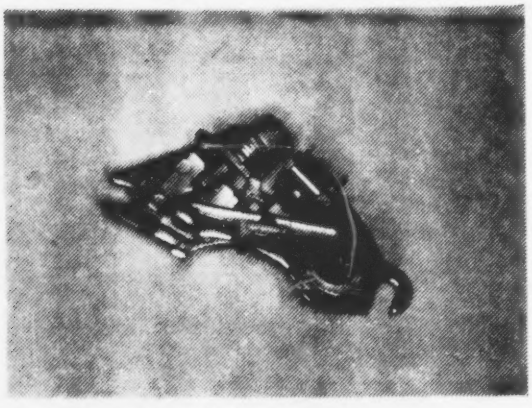
STEP 1 – The spark plug wire sends voltage to the spark plug.

STEP 2 – The distributor cap sends the voltage to one cylinder.



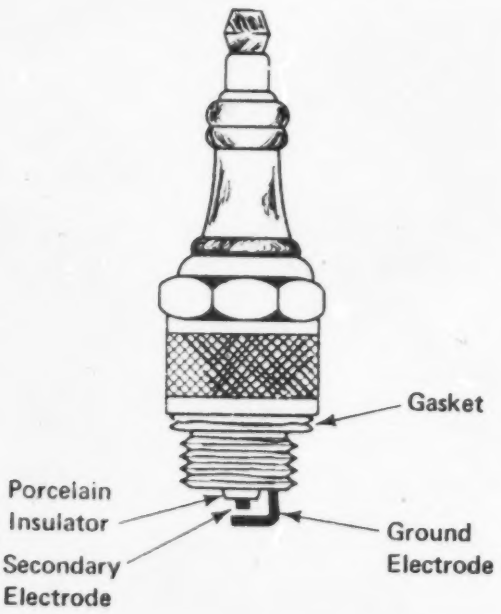
STEP 3 – The rotor selects the cylinder that gets the voltage.

STEP 4 – The condenser prevents the arcing of the points.



STEP 5 – This is a contact point set. It is made of two electrical contact points which close, sending the voltage to the spark plug.

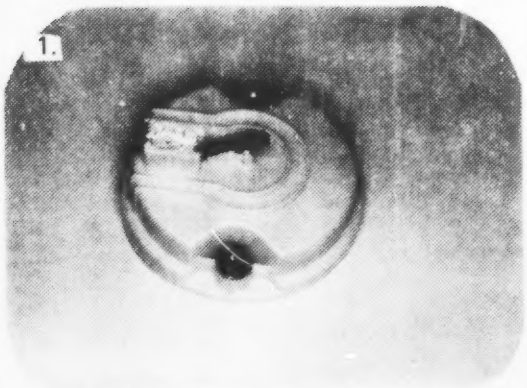
STEP 6 – The spark plug is located in the cylinder of the engine. The arc produced by the plug ignites the fuel to drive the piston.

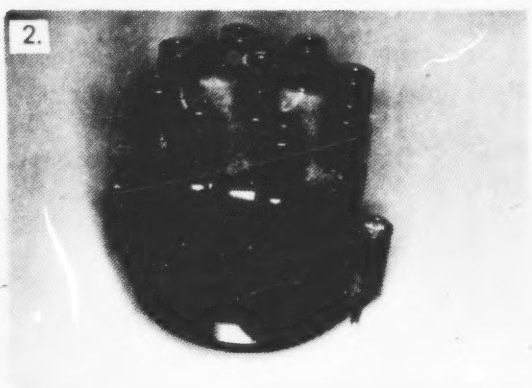


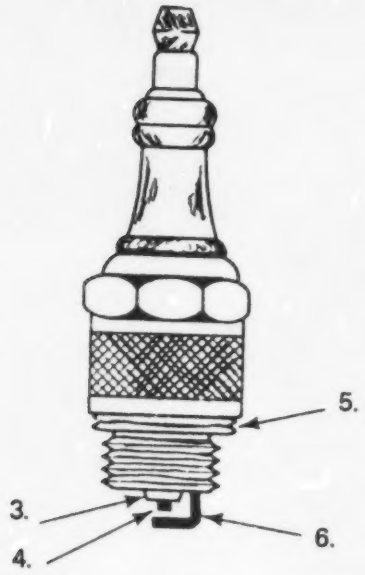
STEP 7 – Identify the parts of the spark plug:
Porcelain Insulator
Secondary Electrode
Gasket
Ground Electrode

Check Point

On a separate sheet of paper, identify the following, Nos. 1 - 10. Turn in your answer sheet to your instructor.



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3.
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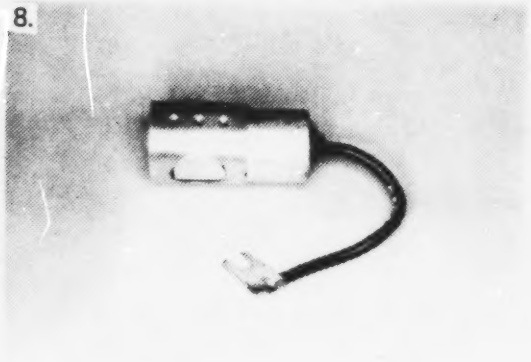
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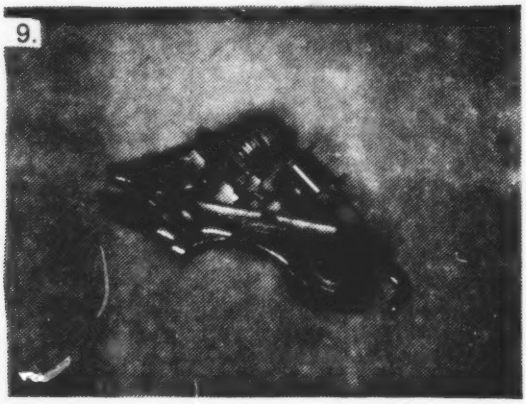
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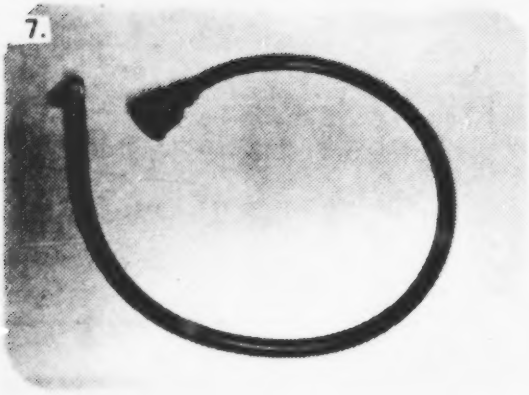
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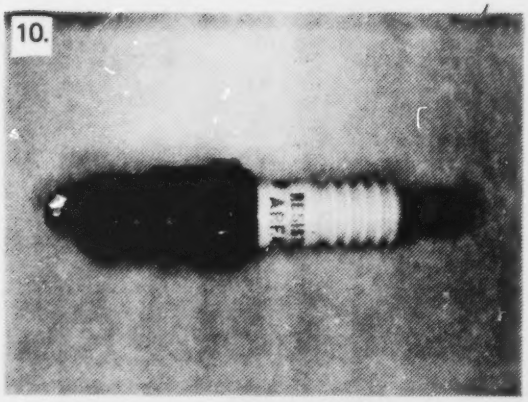
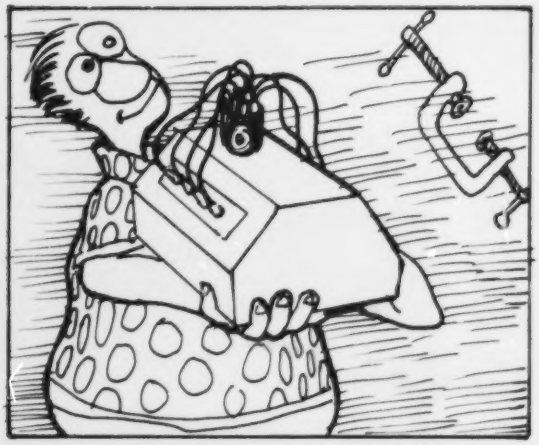
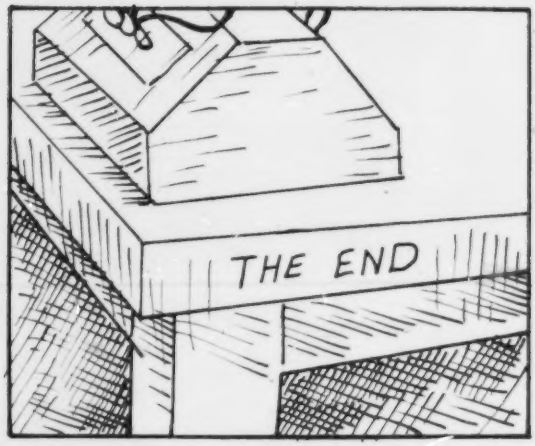


Instructional Objective III

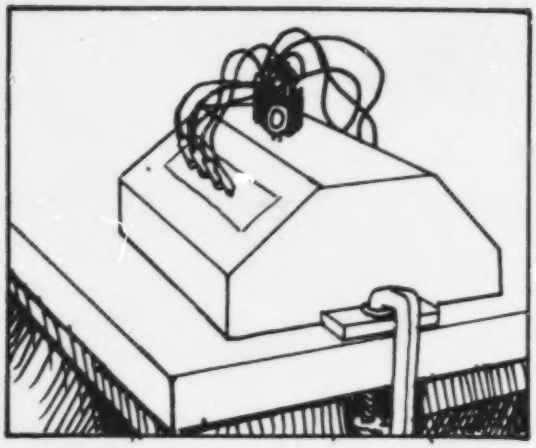
The student will clamp the engine mock-up to a table.



STEP 1 – Obtain the engine mock-up and the C-clamp.



STEP 2 – Place the engine mock-up near a table end.



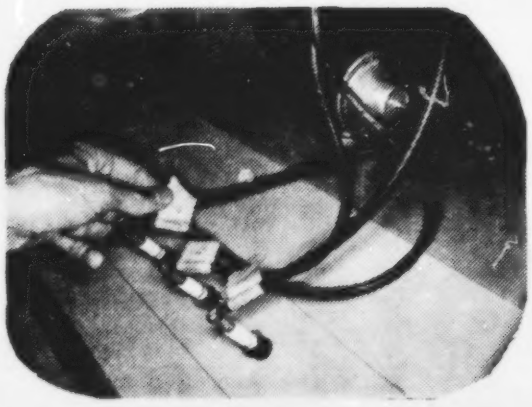
STEP 3 – Secure the engine to the table with the C-clamp.

Check Point

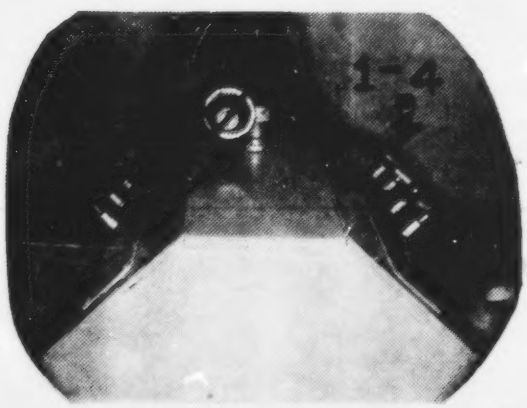
Have the instructor or another student check to see if the engine is secured to the tabletop.

Instructional Objective IV

The student will disconnect the spark plug wire.

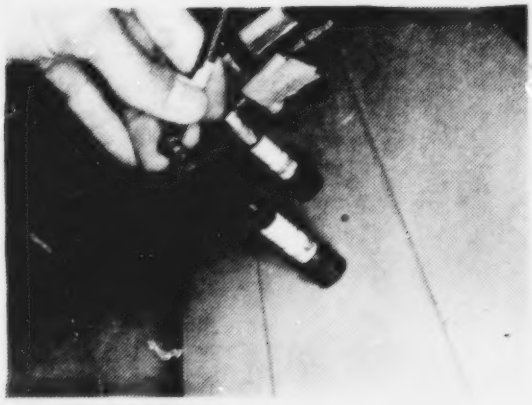


STEP 1 – Label each wire by placing masking tape around it.



STEP 2 – Number the right bank (side) 1 - 4 and the left bank (side) 5 - 8.

STEP 3 – Grasp the spark plug wire by the metal cap.



STEP 4 – Pull the metal cap toward you. This removes the spark plug wire from the spark plug.

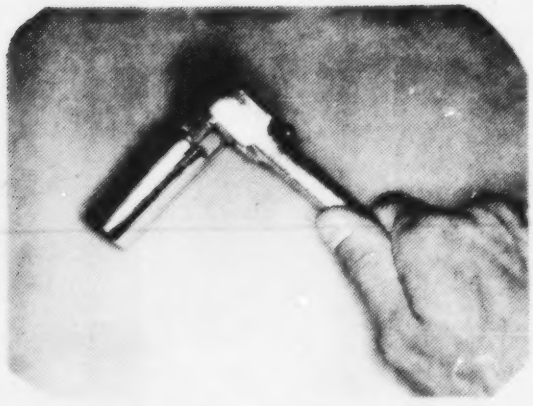
CHECKPOINT

Have your instructor check your work sheet.

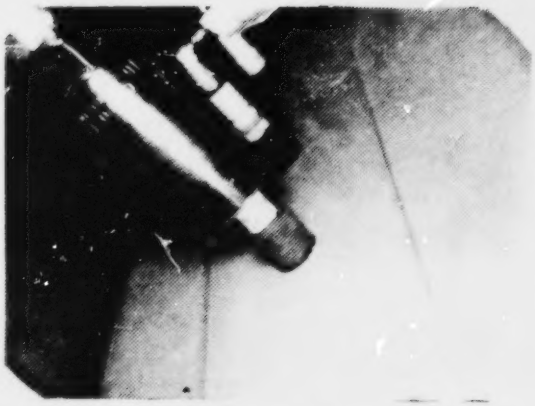
Instructional Objective V

The student will remove the spark plug from the engine mock-up. Start at the right rear side.

STEP 1 – Obtain the 5/8" spark plug socket and the 1/2" drive socket wrench.

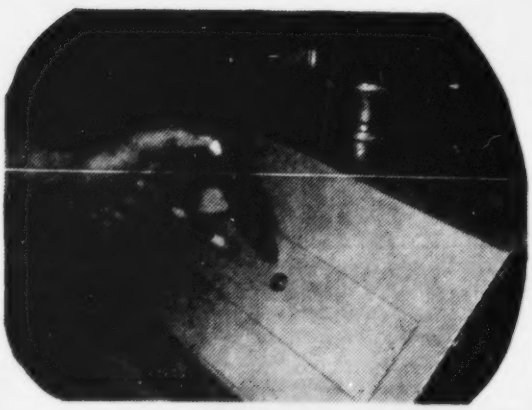


STEP 2 – Attach the spark plug socket to the ½" (1.27 cm) socket wrench.



STEP 3 – Place the socket over the spark plug.

STEP 4 – Turn the wrench counterclockwise.



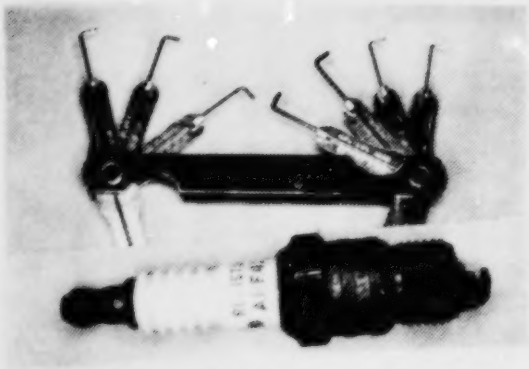
STEP 5 – Remove the spark plug from the block.

Check Point

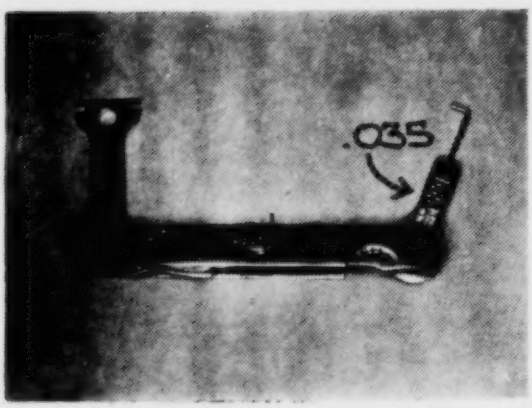
Have the instructor initial your check sheet.

Instructional Objective VI

The student will set the gap for a spark plug.



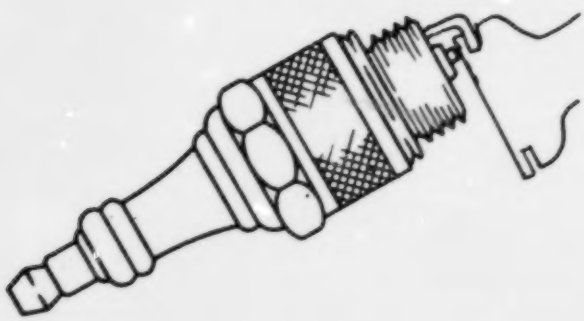
STEP 1 – Obtain a new spark plug and the wire feeler gage.



STEP 2 – Use the .035 wire and bending tool to set the gap of the electrode.

STEP 3 – Check the gap of the plug with the .035 wire.

STEP 4 – Place the bending tool on the ground electrode.



STEP 5 – GENTLY bend to open or close the gap of the plug.

STEP 6 – Place the .035 wire between the ground electrode and secondary electrode.

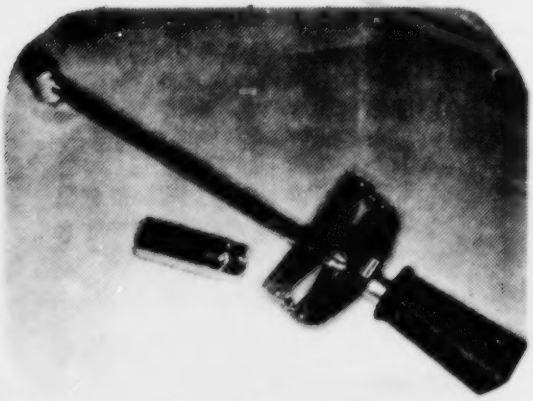
STEP 7 – The wire should fit snugly, not too tight nor too loose.

Check Point

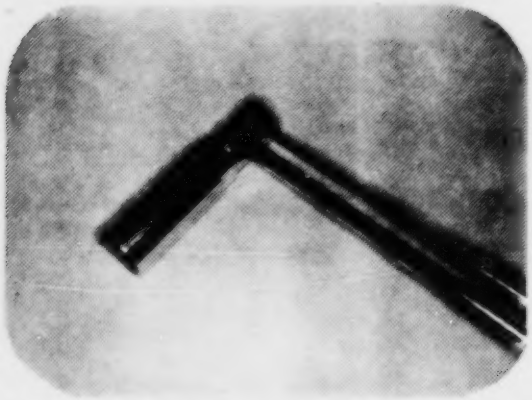
Have your instructor initial your check sheet upon completion of the objective.

Instructional Objective VII

The student will replace and torque the spark plugs in the engine.

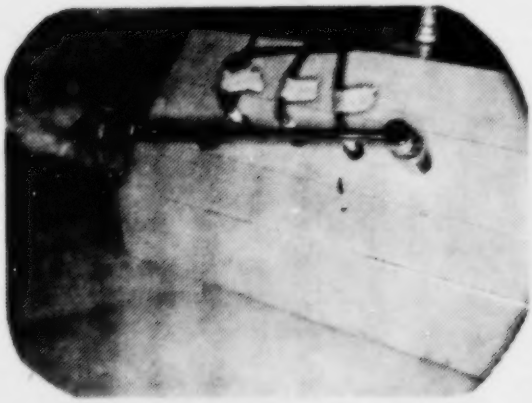


STEP 1 – Obtain the torque wrench and spark plug socket.

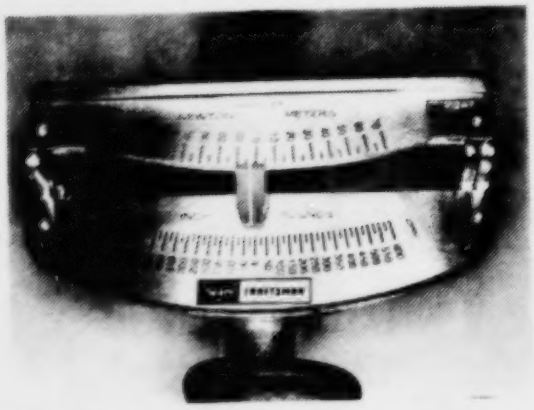


STEP 2 – Attach the spark plug socket to the torque wrench.

STEP 3 – Using your hand, guide the spark plug into the block and hand-tighten.



STEP 4 – Using the torque wrench with the spark plug socket, tighten the plug, turning clockwise.



STEP 5 – While tightening the spark plug, watch the needle of the torque wrench. Stop turning when the needle reaches the 30 foot-pound (13.6 kg) mark.

Check Point

Have your instructor initial your check sheet.

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Instructional Objective VIII

The student will replace the spark plug wire.

STEP 1 – Grasp the metal cap of the spark plug wire in your fingers.

STEP 2 – Push the metal cap back over the top of the spark plug.

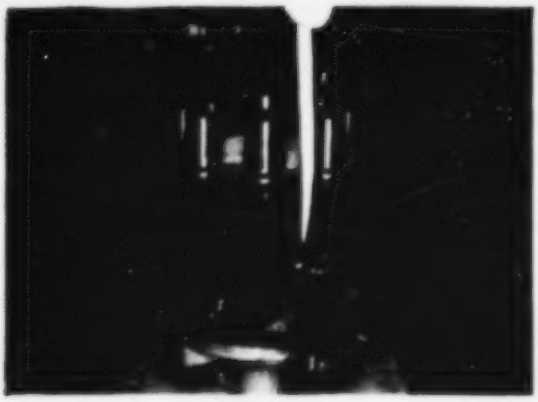
STEP 3 – You should hear a snap sound when the wire has been properly attached to the spark plug.

Check Point

Have your instructor initial your check sheet. Follow objectives IV through VIII on the remaining spark plugs.

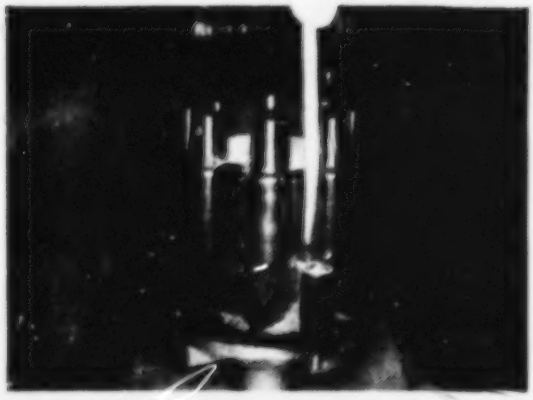
Instructional Objective IX

The student will remove the distributor cap.



STEP 1 – Locate the distributor cap on the engine mock-up and obtain a screwdriver.

STEP 2 – Place the screwdriver blade on one of the locking screws on the cap.



STEP 3 – Press down and twist the screw counterclockwise to disconnect the locking screw.

STEP 4 – Repeat steps 2 and 3 to remove the other locking screw.

STEP 5 – Pull up on the distributor cap, exposing the interior of the cap.

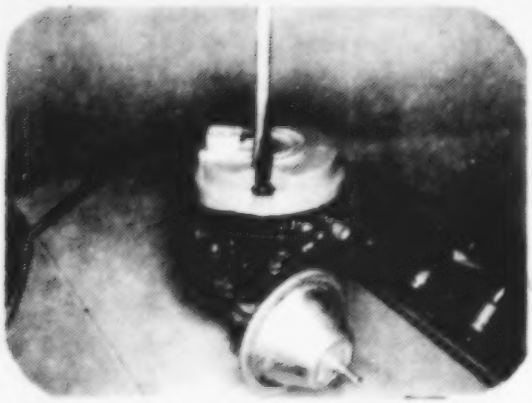
Check Point

Have your instructor initial your check sheet.

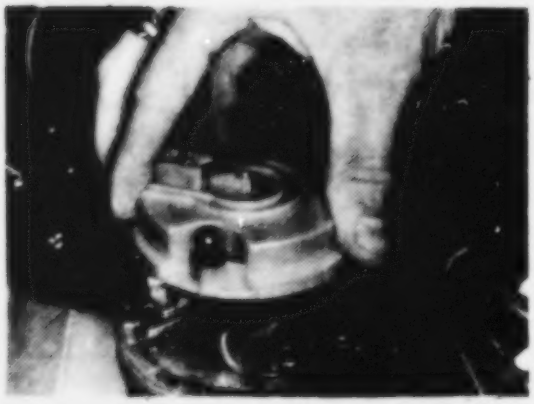
Instructional Objective X

The student will remove the rotor.

STEP 1 – Locate the rotor on the distributor shaft.



STEP 2 – Unscrew both locking screws on top of the rotor.



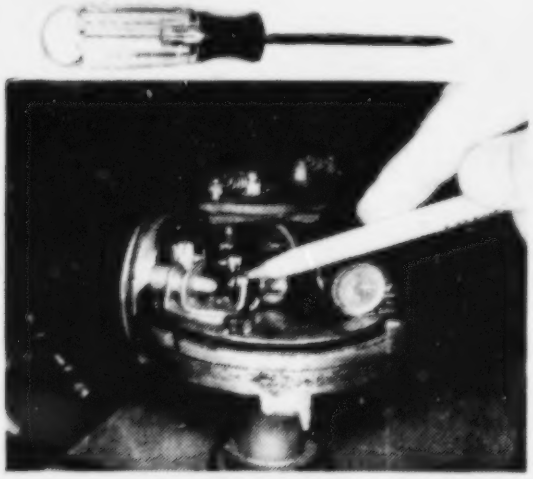
STEP 3 – Grasp the rotor with your hand and remove it by pulling up.

Check Point

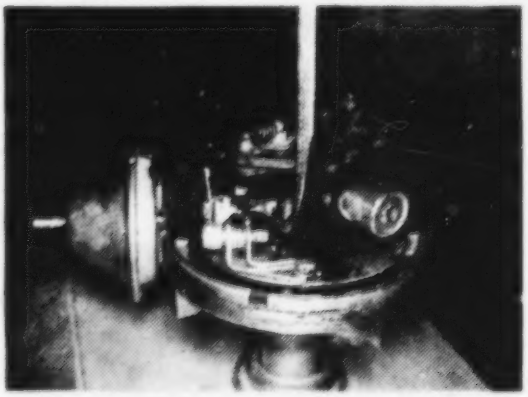
Have your instructor initial your check sheet.

Instructional Objective XI

The student will remove the points and condenser.



STEP 1 – Obtain the magnetic screwdriver and locate the points and condenser.



STEP 2 – Using the magnetic screwdriver, remove both screws in the base of the points.

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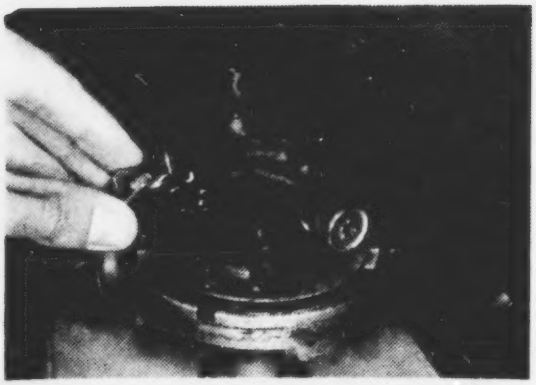
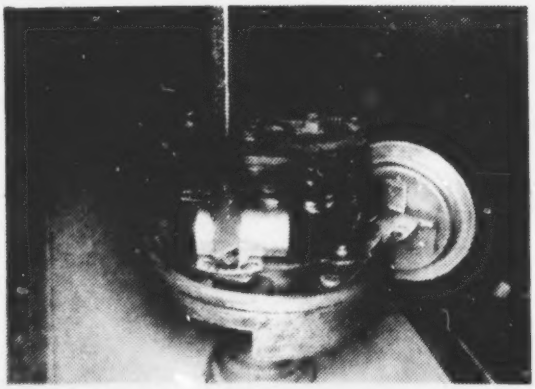
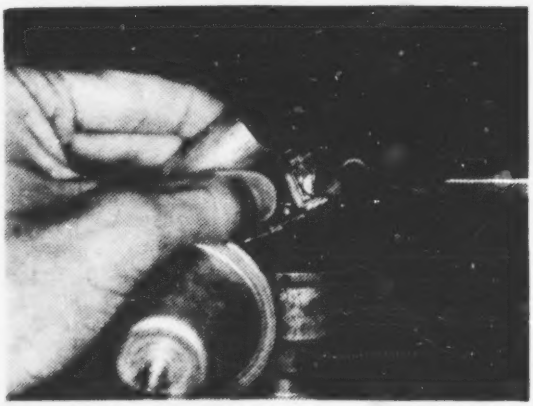


STEP 3 – Remove the old points.



STEP 4 – Remove the screw that holds the condenser to the base.



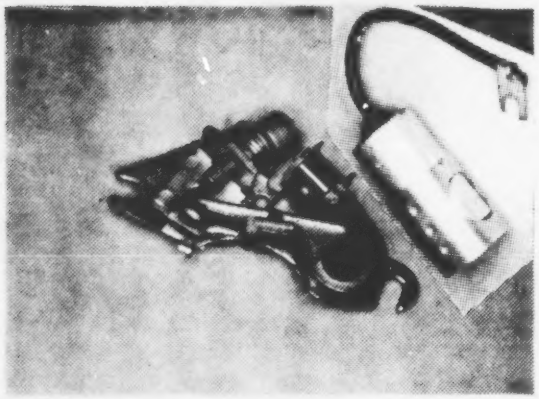
STEP 5 – Remove the condenser wire from the points by loosening the locking screw with the screwdriver.

Check Point

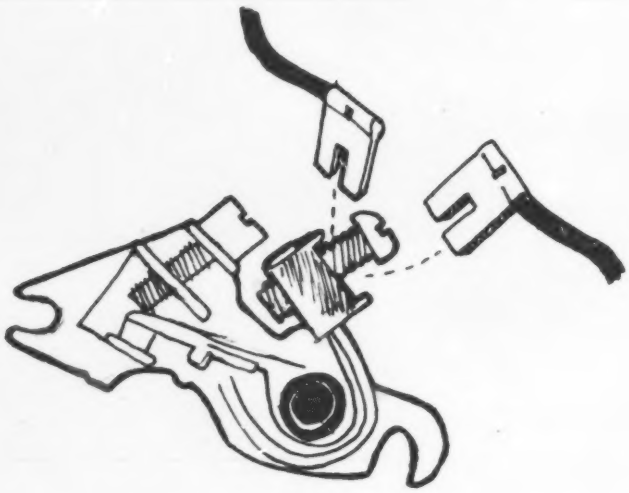
Have your instructor initial your check sheet.

Instructional Objective XII

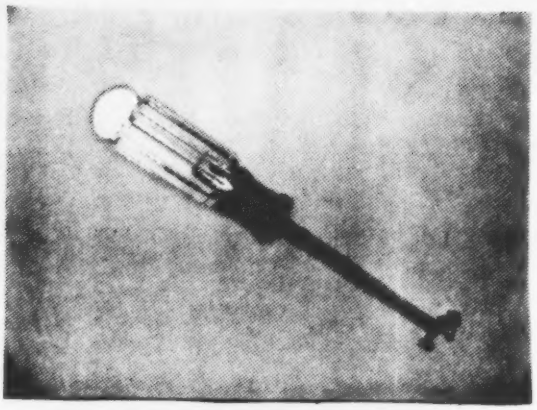
The student will replace the points and condenser.



STEP 1 – Obtain the new points, new consenser, and magnetic screwdriver.



STEP 2 – Secure the distributor wire and condenser wire to the plastic slot on the points with the locking screw.



STEP 3 – Place the new points and condenser down on the plate; using the magnetic screwdriver, tighten the three screws you removed from the distributor plate.

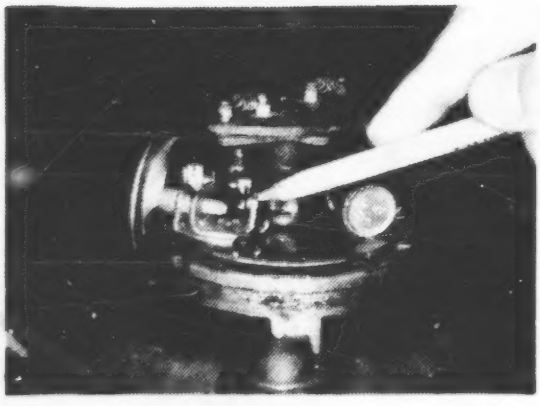
Check Point

The instructor will initial the student check sheet.

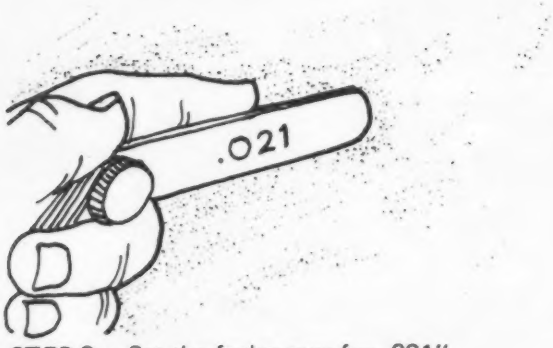
Instructional Objective XIII

The student will set the points.

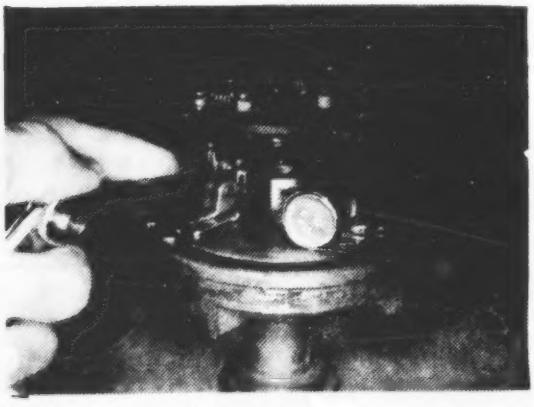
STEP 1 – You will obtain the magnetic screwdriver and the feeler gage.



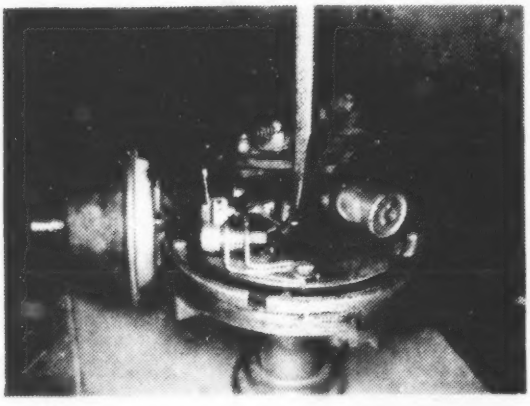
STEP 2 – Turn the shaft on the distributor until the points open and the cam is on a high point.



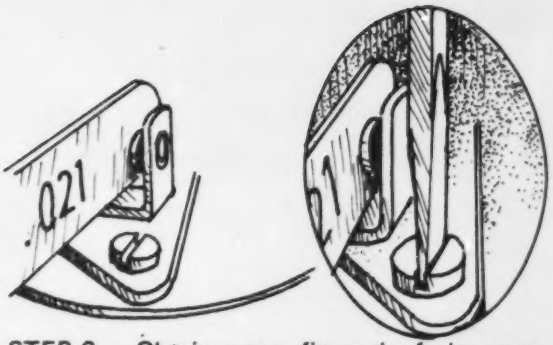
STEP 3 – Set the feeler gage for .021".



STEP 4 – Place the .021" blade in the opening of the points.



STEP 5 – Using the screwdriver, loosen the screw closest to the outside of the distributor cap that holds the points.



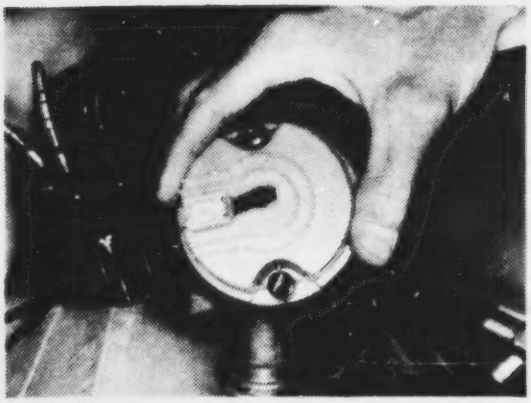
STEP 6 – Obtain a snug fit on the feeler gage and tighten the screw with the screwdriver.

Check Point

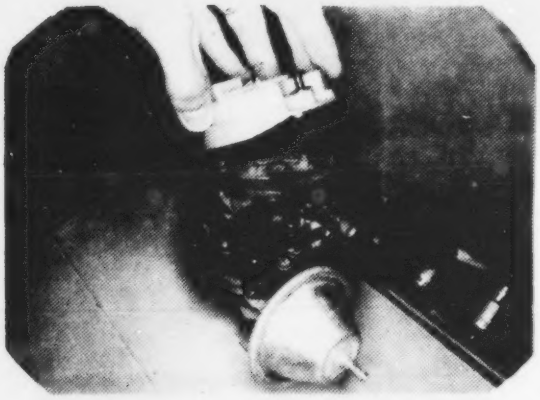
Have your instructor initial your check sheet.

Instructional Objective XIV

The student will replace the rotor.



STEP 1 – Obtain the rotor.



STEP 2 – Align the rotor and gently push the rotor down.

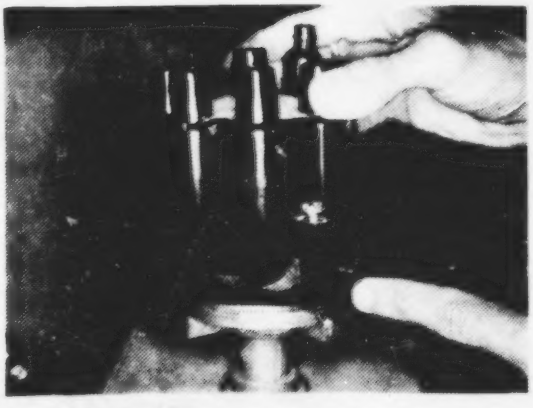
STEP 3 – Secure rotor to distributor by tightening both locking screws.

Check Point

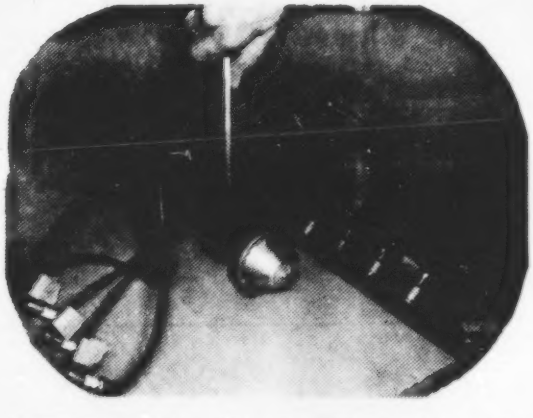
Have your instructor initial your check sheet.

Instructional Objective XV

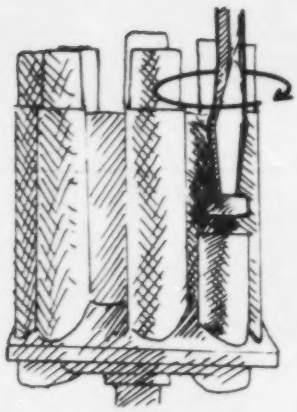
The student will replace the distributor cap.



STEP 1 – Pick up the distributor cap and place it down on the distributor, aligning the cap with the notch in the distributor base.



STEP 2 – Using the screwdriver, secure the distributor cap to the base by applying pressure to the locking screw.



STEP 3 – Turn the screw in a clockwise direction and release downward pressure to set locking screw in place.

STEP 4 – Repeat steps 2 and 3 to secure the other locking screw.

Check Point

Have your instructor initial your check sheet.

620.261-010 AUTOMOBILE MECHANIC (auto. ser.) garage mechanic.

Repairs and overhauls automobiles, buses, trucks, and other automotive vehicles: Examines vehicle and discusses with customer or AUTOMOBILE-REPAIR-SERVICE ESTIMATOR (auto. ser.); AUTOMOBILE TESTER (auto. ser.); or BUS INSPECTOR (auto. ser.) nature and extent of damage or malfunction. Plans work procedure, using charts, technical manuals, and experience. Raises vehicle, using hydraulic jack or hoist, to gain access to mechanical units bolted to underside of vehicle. Removes unit, such as engine, transmission, or differential, using wrenches and hoist. Disassembles unit and inspects parts for wear, using micrometers, calipers, and thickness gages. Repairs or replaces parts, such as pistons, rods, gears, valves, and bearings, using mechanic's handtools. Overhauls or replaces carburetors, blowers, generators, distributors, starters, and pumps. Rebuilds parts, such as crankshafts and cylinder blocks, using lathes, shapers, drill presses, and welding equipment. Rewires ignition system, lights, and instrument panel. Relines and adjusts brakes, alines front end, repairs or replaces shock absorbers, and solders leaks in radiator. Mends damaged body and fenders by hammering out or filling in dents and welding broken parts. Replaces and adjusts headlights, and installs and repairs accessories, such as radios, heaters, mirrors, and windshield wipers. May be designated according to specialty as AUTOMOBILE MECHANIC, MOTOR (auto. ser.); BUS MECHANIC (auto. ser.); DIFFERENTIAL REPAIRER (auto. ser.); ENGINE-REPAIR MECHANIC, BUS (auto. ser.); FOREIGN-CAR MECHANIC (auto. ser.); TRUCK MECHANIC (auto. ser.). When working in service station may be designated AUTOMOBILE-SERVICE-STATION MECHANIC (auto. ser.). Additional titles: COMPRESSOR MECHANIC, BUS (auto. ser.); DRIVE-SHAFT-AND-STEERING-POST REPAIRER (auto. ser.); ENGINE-HEAD REPAIRER (auto. ser.); MOTOR ASSEMBLER (auto. ser.).

915.467-010 AUTOMOBILE-SERVICE-STATION ATTENDANT (auto. ser.) filling-station attendant; gas-station attendant; gas tender; service-station attendant.

Services automobiles, buses, trucks, and other automotive vehicles with fuel, lubricants, and accessories: Fills fuel tank of vehicles with gasoline or diesel fuel to level specified by customer. Observes level of oil in crankcase and amount of water in radiator, and adds required amounts of oil and water. Adds necessary amount of water to battery, and washes windshield of vehicle. Lubricates vehicle and changes motor oil [LUBRICATION SERVICER (auto. ser.)]. Replaces accessories, such as oil filter, air filter, windshield wiper blades, and fan belt. Installs antifreeze and changes spark plugs. Repairs or replaces tires [TIRE REPAIRER (auto. ser.)]. Replaces lights, and washes and waxes vehicle. Collects cash from customer for purchases and makes change or charges purchases, using customer-charge plate. May adjust brakes [BRAKE ADJUSTER (auto. ser.)]. May sell batteries and automobile accessories usually found in service stations. May assist in arranging displays, taking inventories, and making daily reports.